

Small Mammal Inventory of Alaska's National Parks and Preserves



Inventory Methods



Literature Review
Museum Collection Review
USNM
AMNH
Burke Museum
Slater
MVZ
UAM
MSB
Field Museum
KU
UCLA
Field Sampling

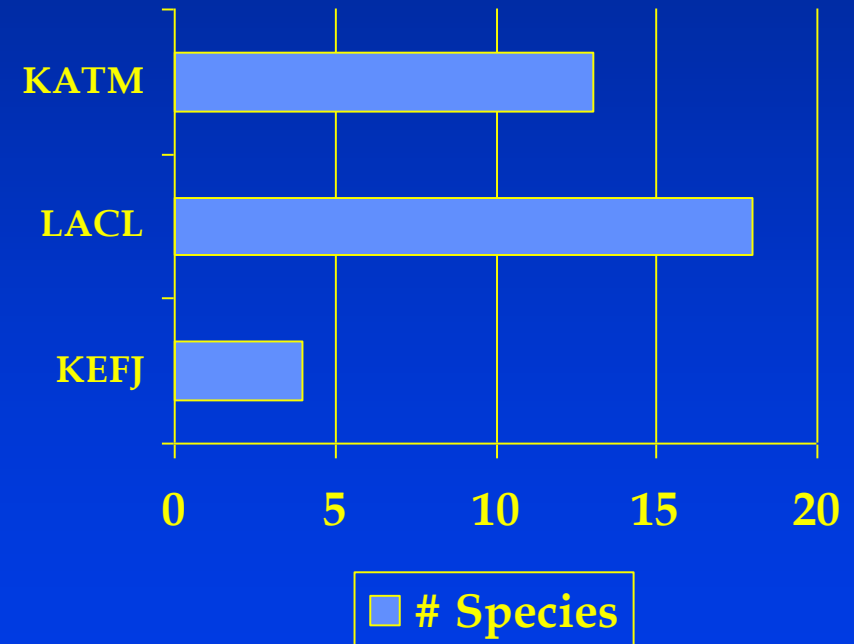
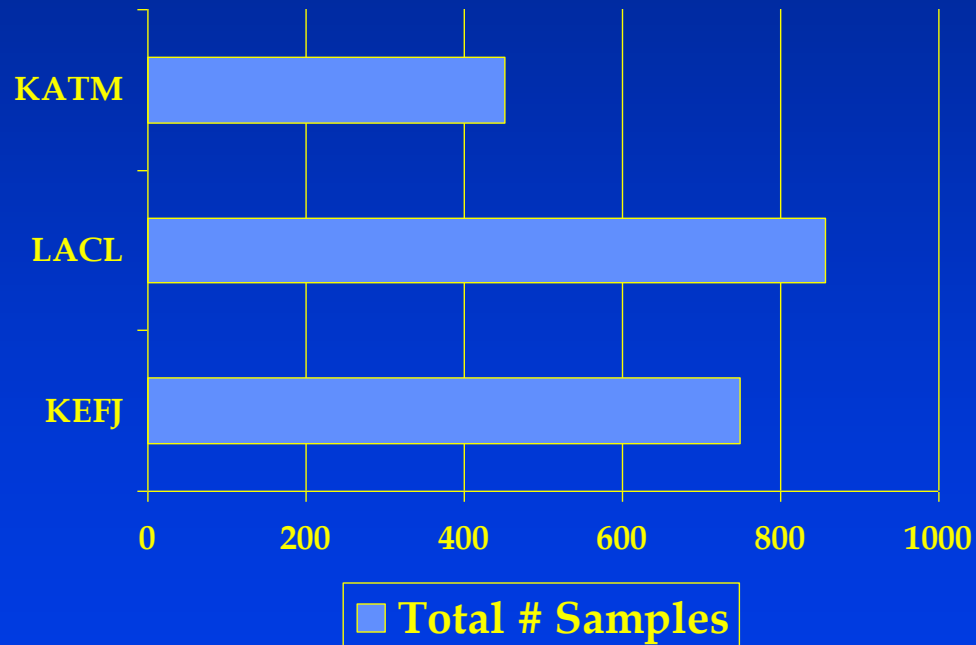
Field Methods



Standardized Traplines Archival Sampling

- Skeleton, Skin
- Whole Body (ETOH)
- Tissues (frozen)
- Embryos
- Ectoparasites
- Endoparasites
- Feces
- Intestinal Tract (shrews)

Sampling Effort



What's New?

KEFJ

- Cinereus Shrew
- Montane Shrew
- N. Red-backed Vole
- Tundra Vole

LACL

- Pygmy Shrew
- Montane Shrew
- Tundra Shrew
- Tiny Shrew
- Little Brown Bat
- Singing Vole
- Collared Pika
- Ermine

KATM

- Pygmy Shrew
- Tundra Shrew
- Hoary Marmot

Who's Still Missing?

KEFJ

- Pygmy Shrew
- Little Brown Bat
- Singing Vole
- N. Bog Lemming
- Muskrat
- Porcupine
- Hoary Marmot
- Red Squirrel
- Snowshoe Hare
- Ermine

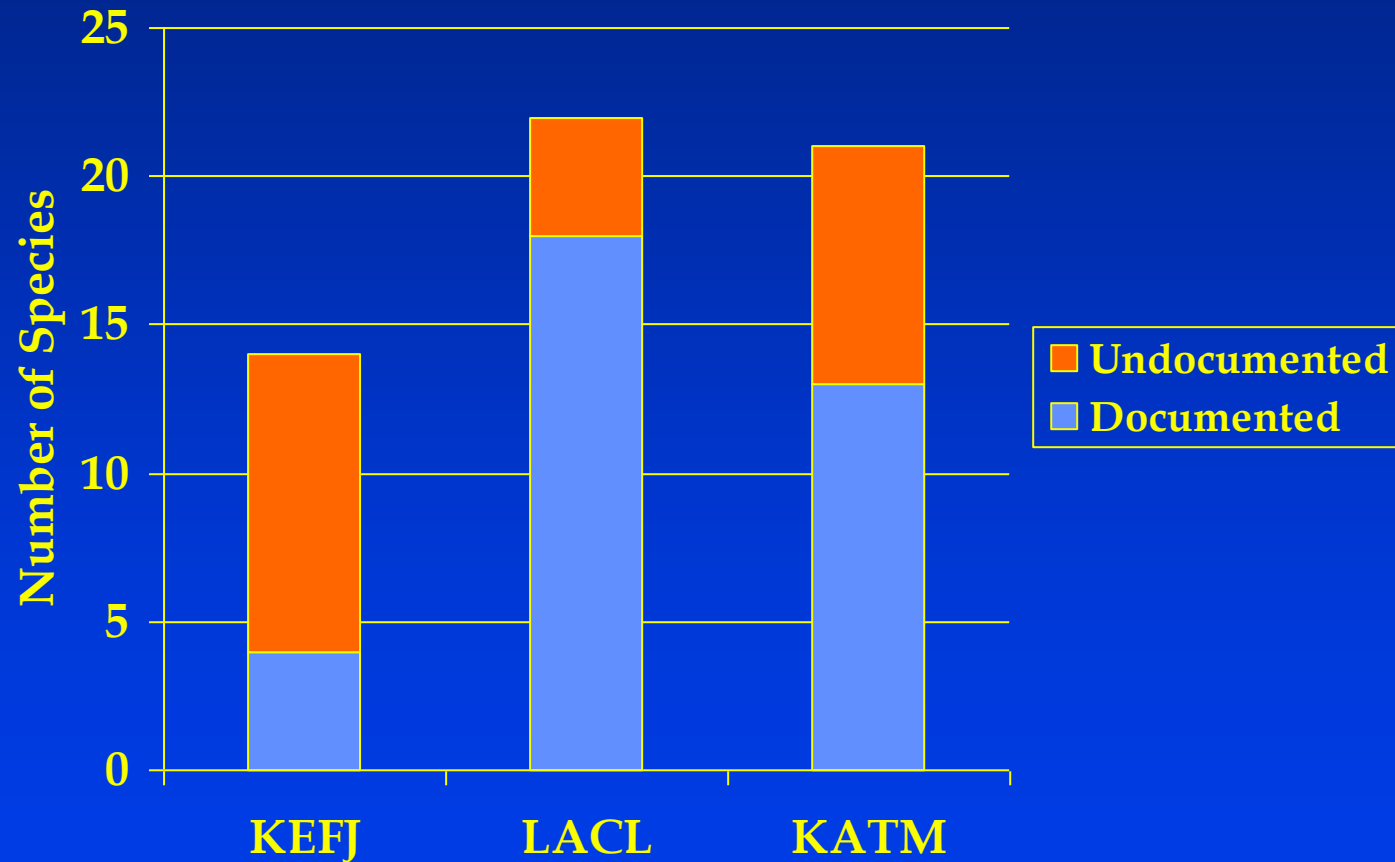
LACL

- Brown Lemming
- Porcupine
- Hoary Marmot
- Least Weasel

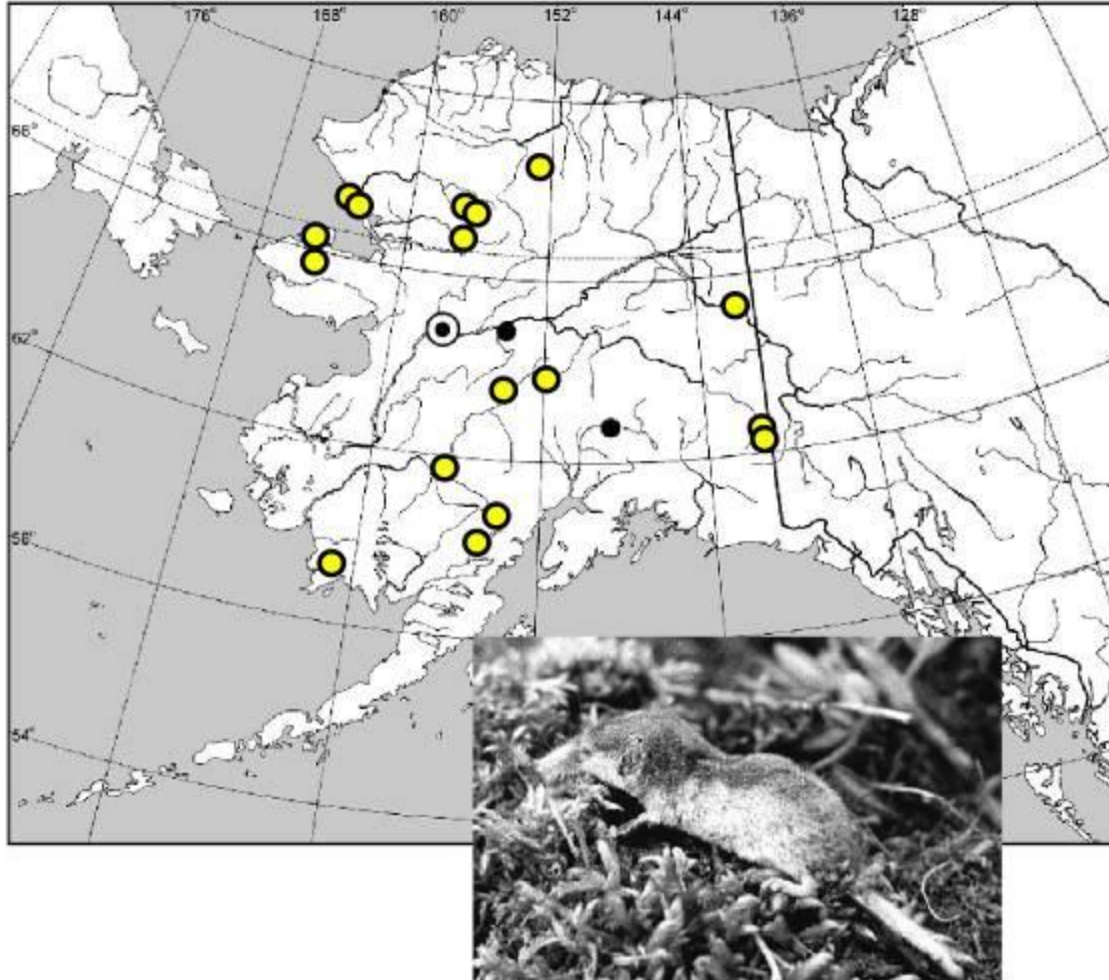
KATM

- Little Brown Bat
- Collared Lemming
- Brown Lemming
- Muskrat
- Porcupine
- Alaskan Hare
- Ermine
- Least Weasel

Filling In the Gaps



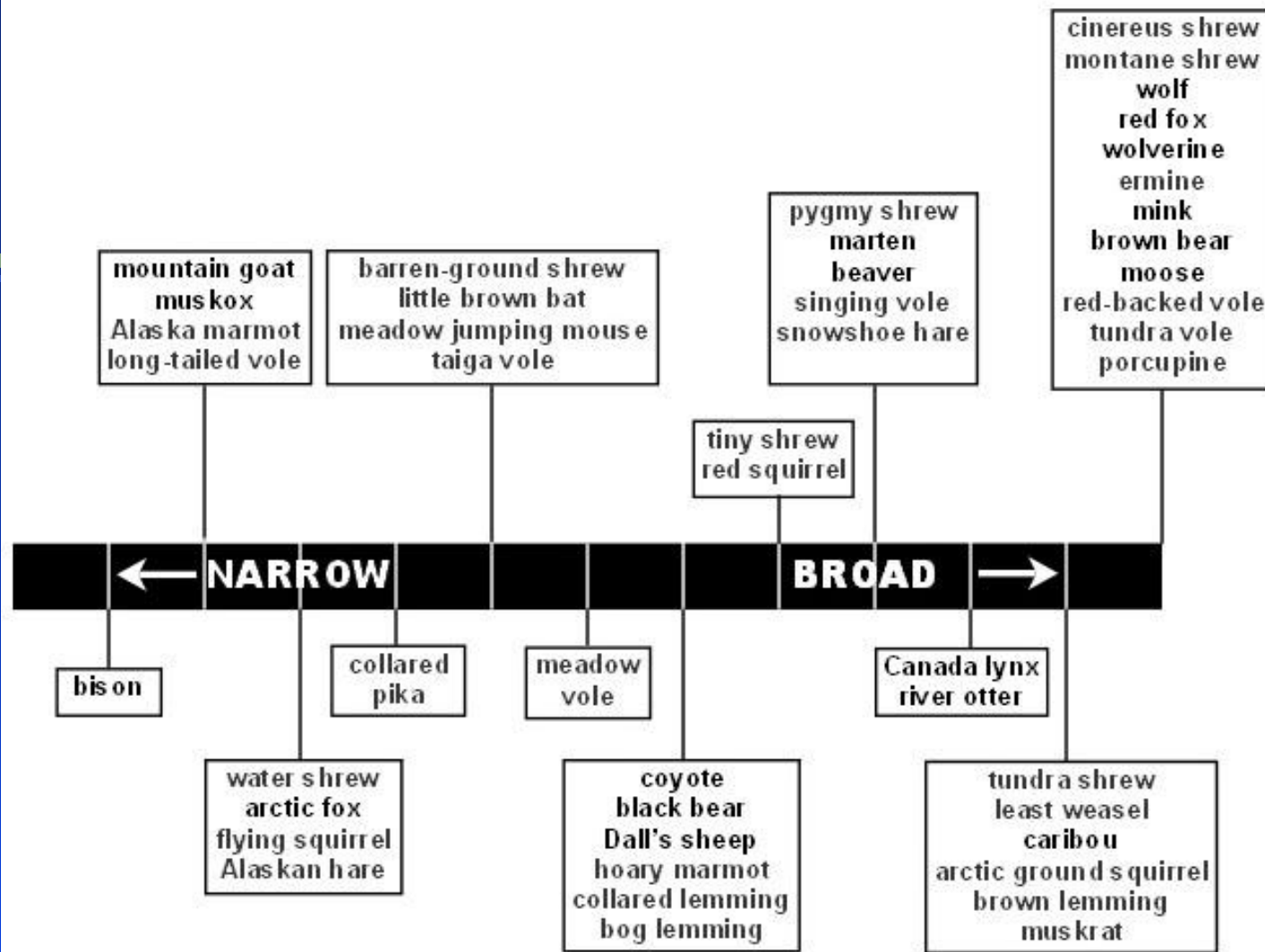
A New Shrew for North America



**New records of
Tiny Shrew
(*Sorex yukonicus*)
as a result of NPS
efforts**

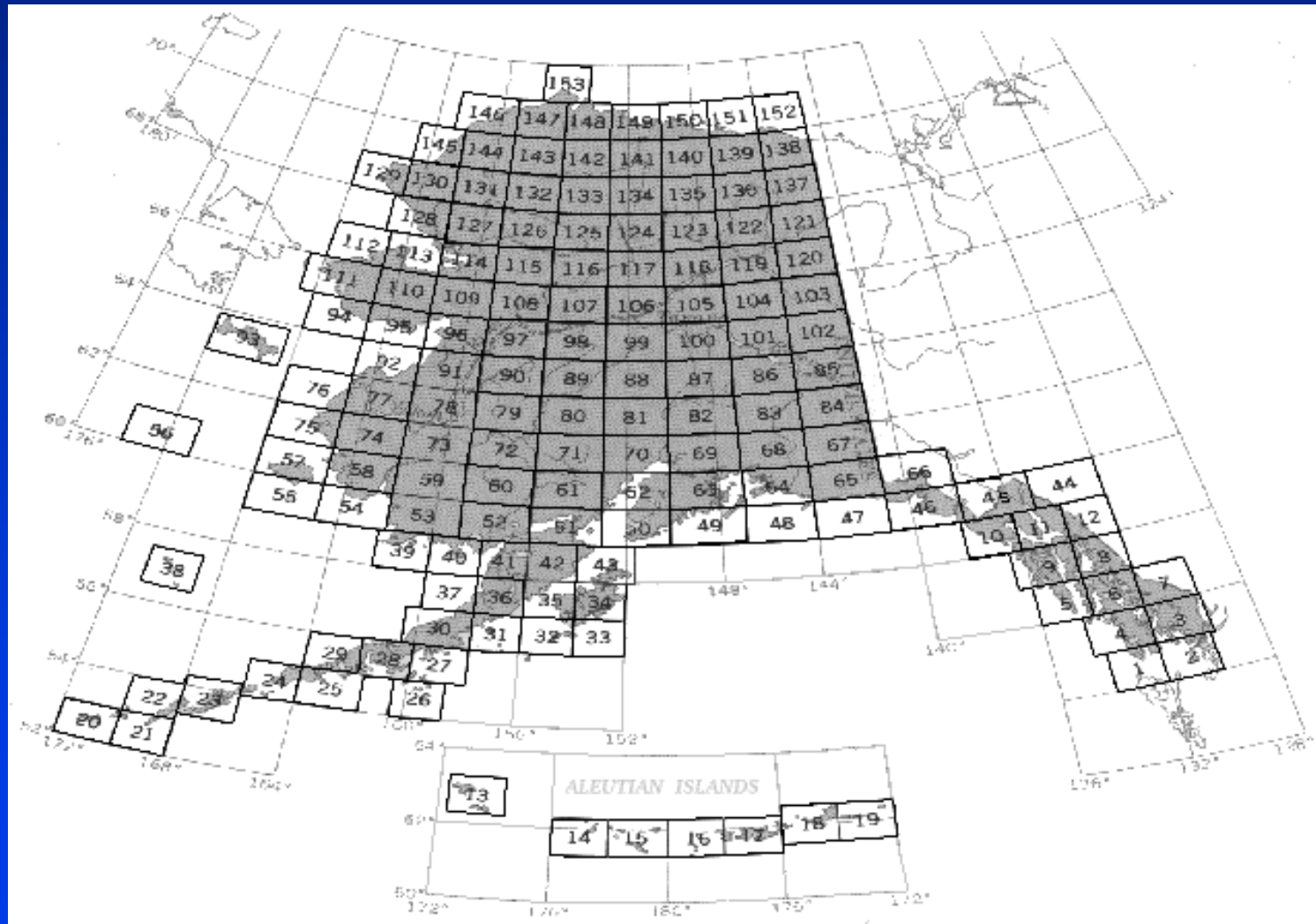
Novel Morphotypes



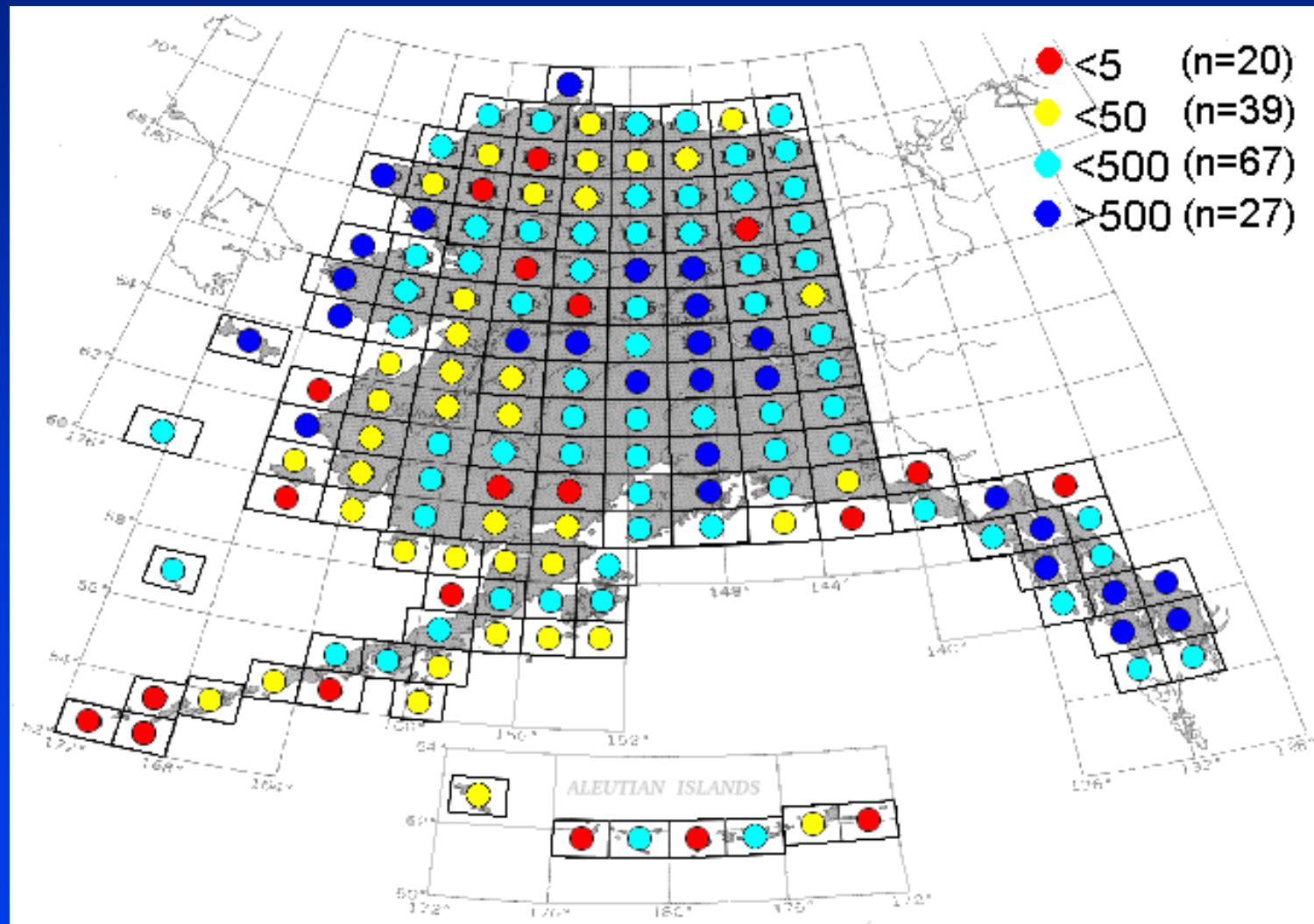


Range of occurrence of mammal species across 12 of Alaska's National Park Units (Southeast network excluded). For example, cinereus shrew and red-backed vole are broadly distributed, occurring in all park units, while long-tailed vole has a relatively narrow distribution, occurring in only 2 of 12 park units.

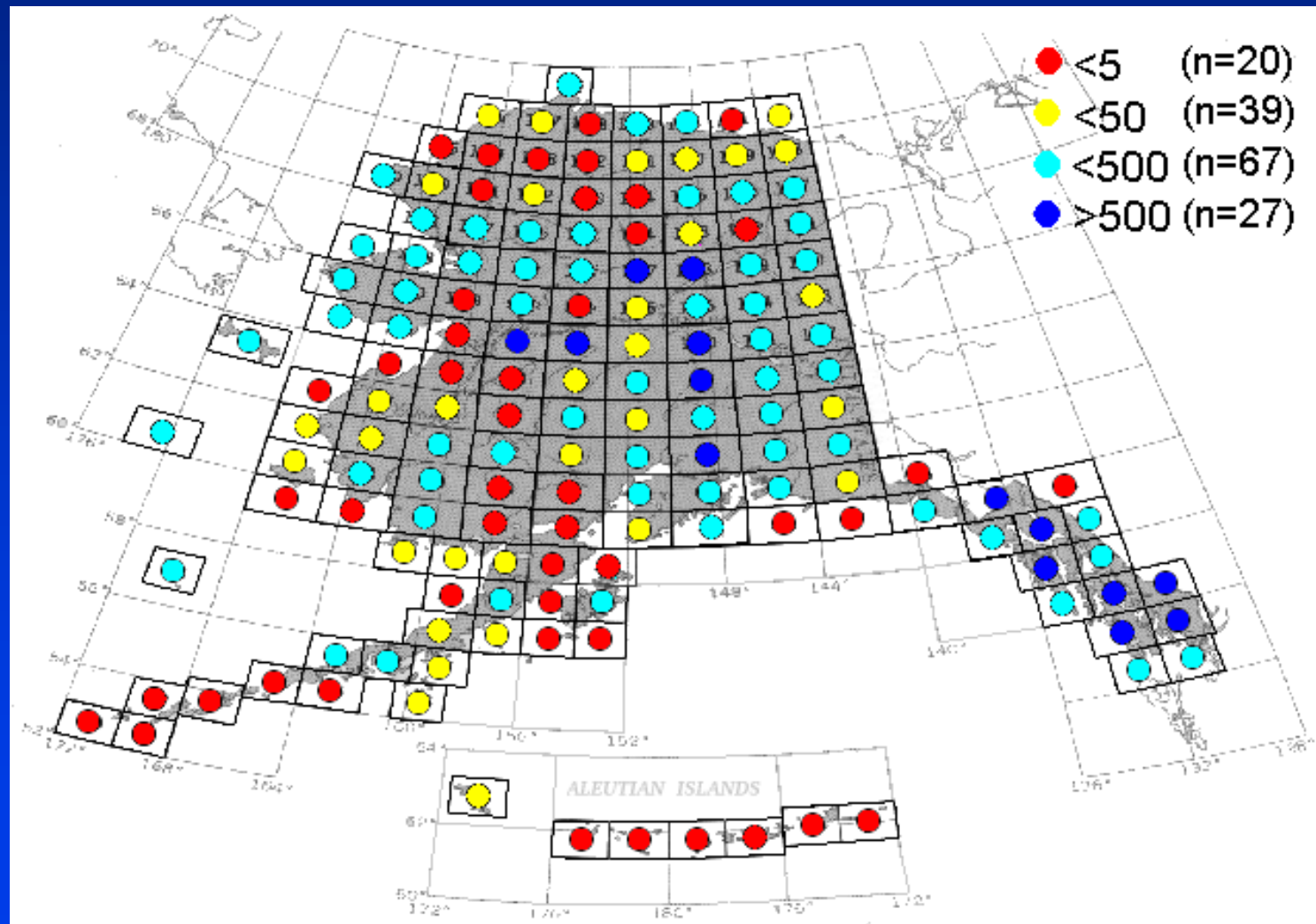
USGS 1 : 250,000 Map Quadrangles



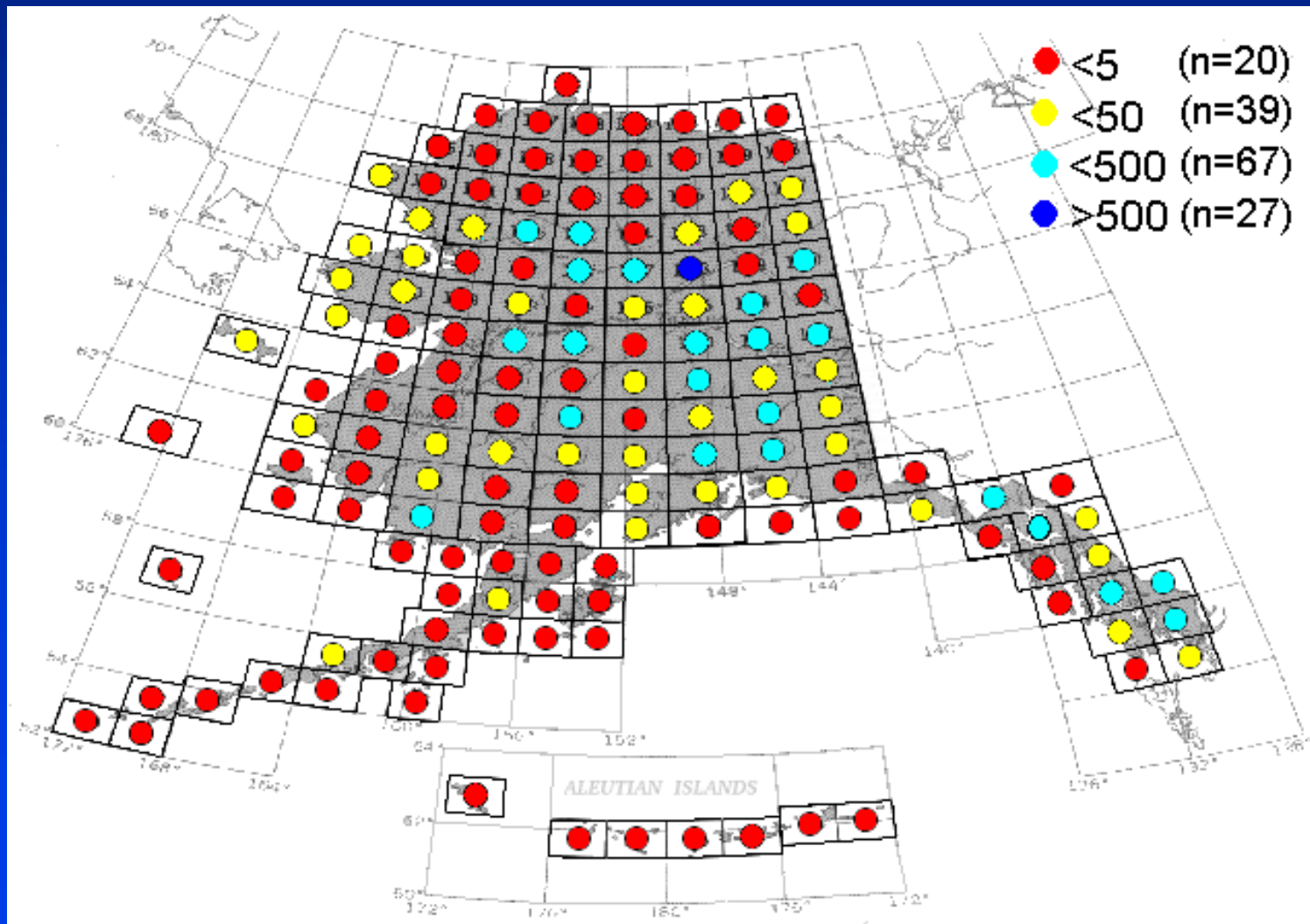
Mammal Specimens per USGS quad



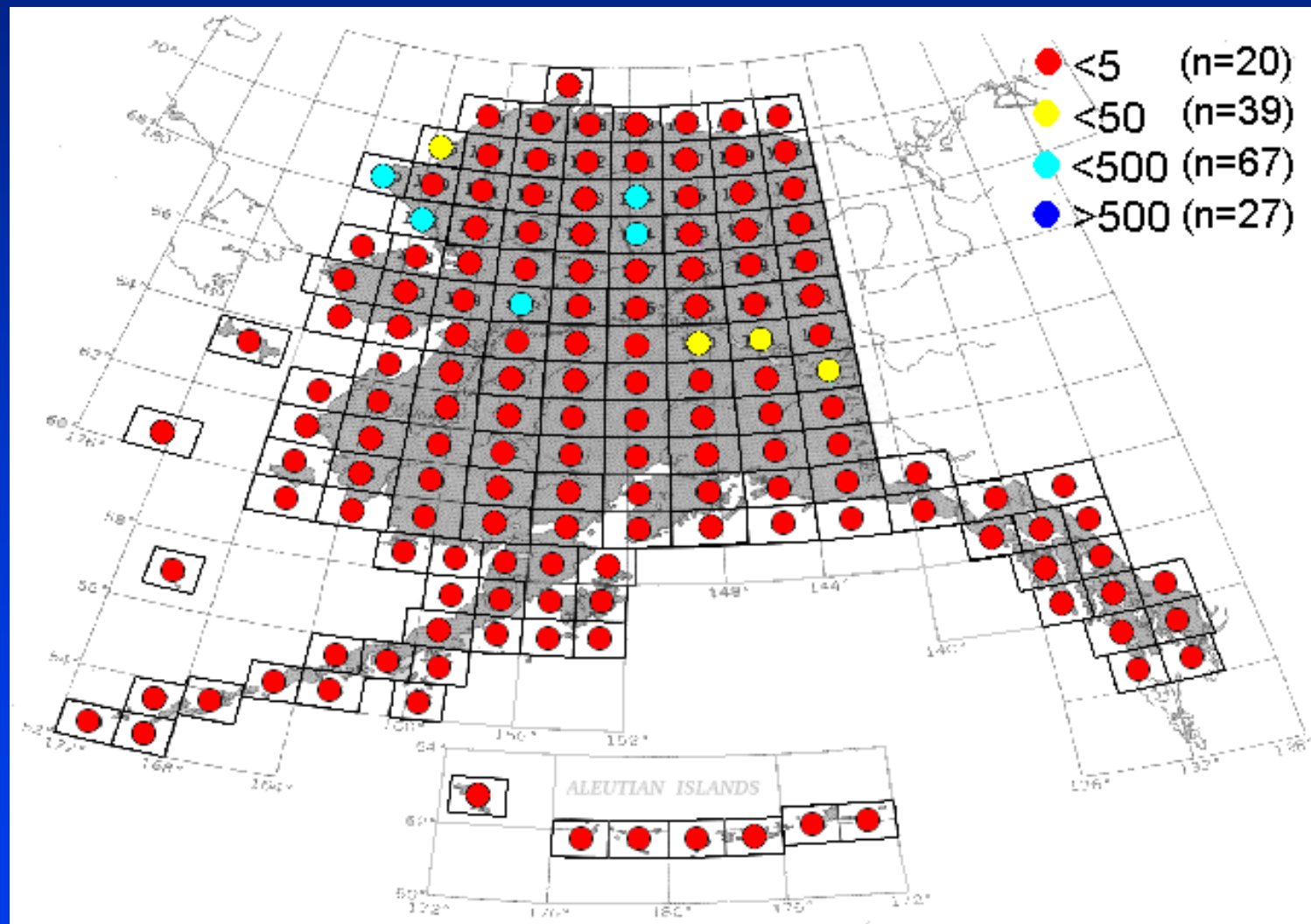
Small Mammals



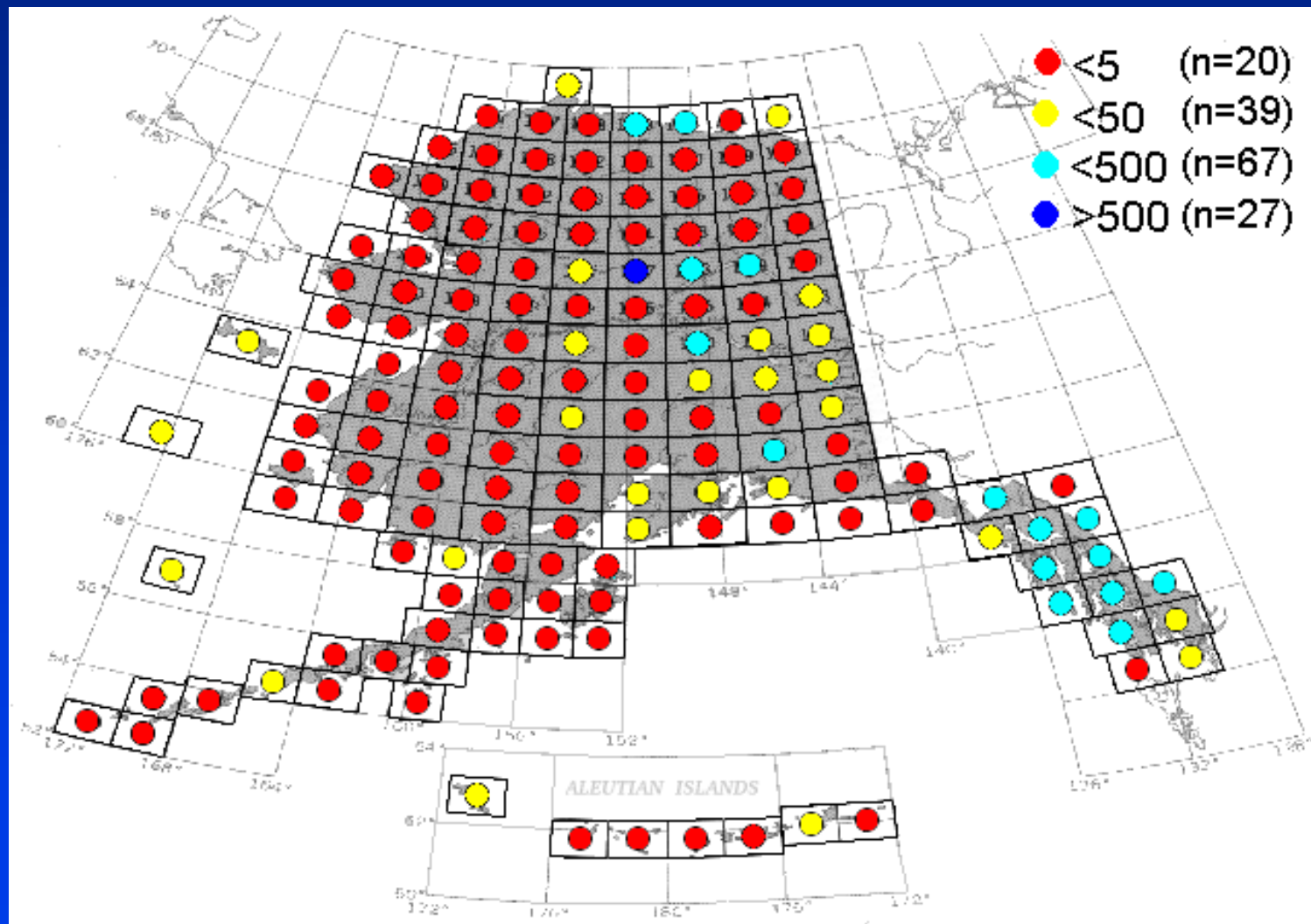
Clethrionomys



Alces and Rangifer combined



All Mammals, one year (1997)



NPS Alaska I & M

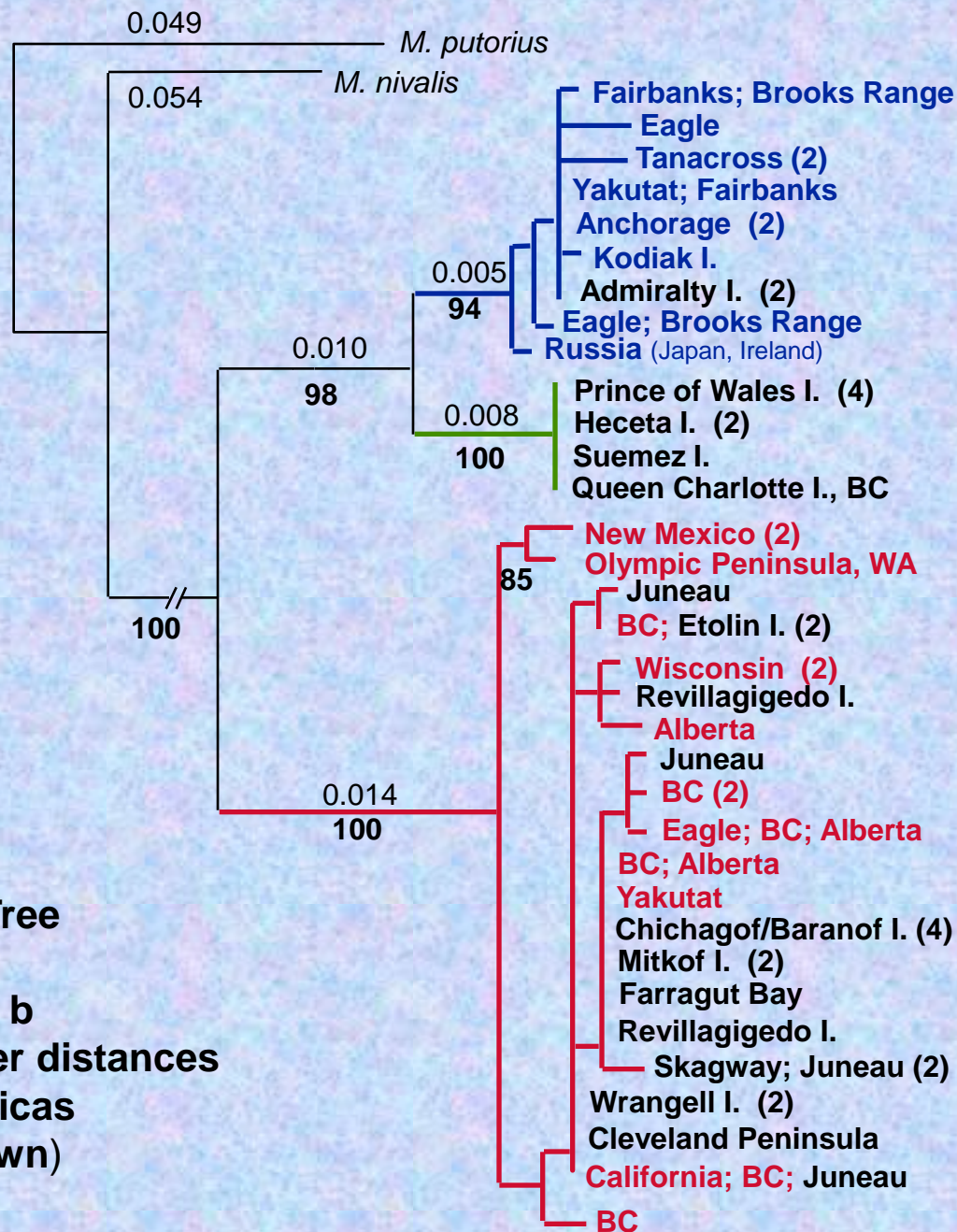
- What?
- When?
- Where?
- Why?

If specimen based, there will be samples available for numerous scientific investigations aimed at addressing these questions on both temporal and spatial scales.

Specimen Uses

- **DNA analyses to establish genetic relationships**
 - among individuals**
 - among populations**
 - among species**

Ermine



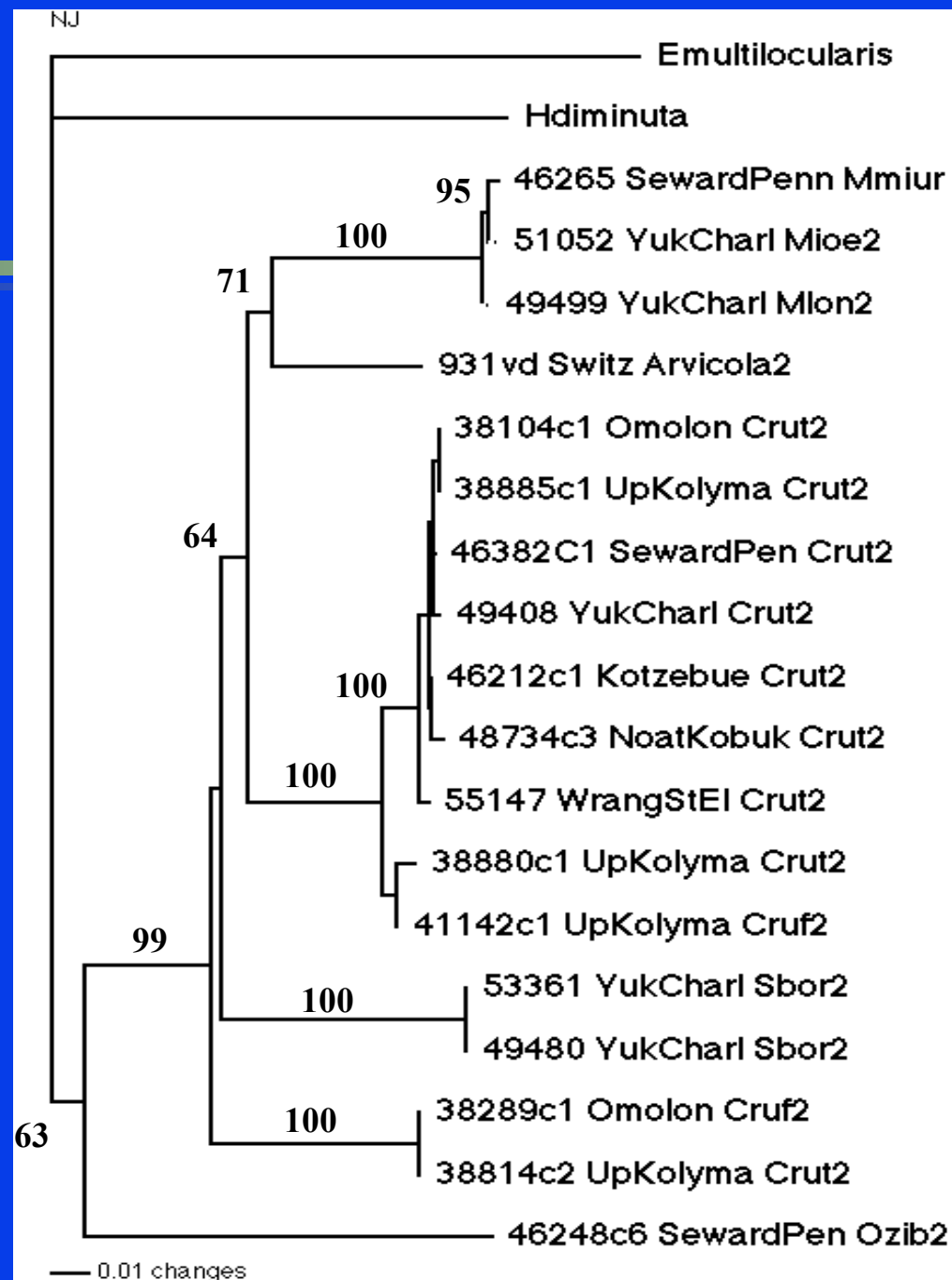
Neighbor-joining Tree
68 Ermine
1140 or 790 bp Cyt b
Kimura 2-parameter distances
500 Bootstrap replicas
(values > 70% shown)

And Parasites?

- Mammalogy-- considerable work ahead...
- Phylogeographic concordance may point to common historical events and lead to predictions
 - » Common breaks may indicate vicariant events
 - Omolon/Kolyma region; Yukon/Alaska border
 - » Common corridors or recolonization routes
- Interdisciplinary approaches provide opportunity for reciprocal illumination

Hymenolepis horrida complex

- 184 worms
- Cytochrome Oxidase I (COI)
- 574 bp
- NJ, K2P, 500 bs



Microtus spp.

Arvicola

Beringian
C. rutilus

C. rut/rufo

Synaptomys

C. rut/rufo

Ondatra

Hymenolepis horrida complex

- Host specificity at level of genus
 - » Compared to anoplocephalids
- Limited host switching
- Cryptic speciation? Opportunity to reexamine morphological characters and use multiple perspectives on diversity
- Concordant break on the Omolon

- Climatic change has impacted evolutionary pathways in the Arctic
 - » Ecological disruption as driver of diversification
 - » Barriers to dispersal or corridors
 - » Potential speciation (vicariance or hybrid)
 - » Levels of intraspecific variation may be high
 - » Are these apparently shared events really temporally congruent?

Phylogeography



**Circumpolar
distributions of
mtDNA lineage
groups of *Lemmus***

(from Fedorov et al. in press)

Specimen Uses

- **Stable-isotope ratios as indicators of ecological relationships or ecosystem health**
 - predator/prey**
 - seasonal shifts (whiskers, baleen)**
 - primary productivity**

Specimen Uses

- **Parasite and disease screening**

Emergent diseases

Historical/baseline infection rates

Surveys of new hosts or pathogens

NPS Alaska I & M Challenges

- Modern Inventory & Monitoring Program
 - » Large sample sizes
 - » Well distributed over time and space
 - » Archive multiple data sets
 - standard specimens
 - various tissue types
 - parasites
 - network and protocols for making material available and connecting scientists and the general public

Important scientific questions for Alaska relate to environmental change.

- Climate change
- Ecosystem integrity
- Habitat change
- Pollutants
- Emerging diseases
- Introduction of exotics
- Loss of biotic diversity

